

Year 5

By the end of Year 5, students use place value to write and order decimals including decimals greater than one. They express natural numbers as products of factors and identify multiples. Students order and represent, add and subtract fractions with the same or related denominators. They represent common percentages and connect them to their fraction and decimal equivalents. Students use their proficiency with multiplication facts and efficient calculation strategies to multiply large numbers by one- and two-digit numbers and divide by single-digit numbers. They check the reasonableness of their calculations using estimation. Students use mathematical modelling to solve financial and other practical problems, formulating and solving problems, choosing arithmetic operations and interpreting results in terms of the situation. They apply properties of numbers and operations to find unknown values in numerical equations involving multiplication and division. Students create and use algorithms to identify and explain patterns in the factors and multiples of numbers.

They choose and use appropriate metric units to measure the attributes of length, mass and capacity, and to solve problems involving perimeter and area. Students convert between 12- and 24-hour time. They estimate, construct and measure angles in degrees. Students use grid coordinates to locate and move positions. They connect objects to their two-dimensional nets. Students perform and describe the results of transformations and identify any symmetries.

They plan and conduct statistical investigations that collect nominal and ordinal categorical and discrete numerical data using digital tools. Students identify the mode and interpret the shape of distributions of data in context. They interpret and compare data represented in line graphs. Students conduct repeated chance experiments, list the possible outcomes, estimate likelihoods and make comparisons between those with and without equally likely outcomes.

AC9M5N01: interpret, compare and order numbers with more than 2 decimal places, including numbers greater than one, using place value understanding; represent these on a number line

AC9M5N02: express natural numbers as products of their factors, recognise multiples and determine if one number is divisible by another

AC9M5N03: compare and order fractions with the same and related denominators including mixed numerals, applying knowledge of factors and multiples; represent these fractions on a number line

AC9M5N04: recognise that 100% represents the complete whole and use percentages to describe, represent and compare relative size; connect familiar percentages to their decimal and fraction equivalents

AC9M5N05: solve problems involving addition and subtraction of fractions with the same or related denominators, using different strategies

AC9M5N06: solve problems involving multiplication of larger numbers by one- or two-digit numbers, choosing efficient calculation strategies and using digital tools where appropriate; check the reasonableness of answers

AC9M5N07: solve problems involving division, choosing efficient strategies and using digital tools where appropriate; interpret any remainder according to the context and express results as a whole number, decimal or fraction

AC9M5N08: check and explain the reasonableness of solutions to problems including financial contexts using estimation strategies appropriate to the context

AC9M5N09: use mathematical modelling to solve practical problems involving additive and multiplicative situations including financial contexts; formulate the problems, choosing operations and efficient calculation strategies, using digital tools where appropriate; interpret and communicate solutions in terms of the situation

AC9M5N010: create and use algorithms involving a sequence of steps and decisions and digital tools to experiment with factors, multiples and divisibility; identify, interpret and describe emerging patterns

AC9M5A01: recognise and explain the connection between multiplication and division as inverse operations and use this to develop families of number facts

AC9M5A02: find unknown values in numerical equations involving multiplication and division using the properties of numbers and operations

AC9M5M01: choose appropriate metric units when measuring the length, mass and capacity of objects; use smaller units or a combination of units to obtain a more accurate measure

AC9M5M02: solve practical problems involving the perimeter and area of regular and irregular shapes using appropriate metric units

AC9M5M03: compare 12- and 24-hour time systems and solve practical problems involving the conversion between them

AC9M5M04: estimate, construct and measure angles in degrees, using appropriate tools including a protractor, and relate these measures to angle names

AC9M5SP01: connect objects to their nets and build objects from their nets using spatial and geometric reasoning

AC9M5SP02: construct a grid coordinate system that uses coordinates to locate positions within a space; use coordinates and directional language to describe position and movement

AC9M5SP03: describe and perform translations, reflections and rotations of shapes, using dynamic geometric software where appropriate; recognise what changes and what remains the same, and identify any symmetries

AC9M5ST01: acquire, validate and represent data for nominal and ordinal categorical and discrete numerical variables, to address a question of interest or purpose using software including spreadsheets; discuss and report on data distributions in terms of highest frequency (mode) and shape, in the context of the data

AC9M5ST02: interpret line graphs representing change over time; discuss the relationships that are represented and conclusions that can be made

AC9M5ST03: plan and conduct statistical investigations by posing questions or identifying a problem and collecting relevant data; choose appropriate displays and interpret the data; communicate findings within the context of the investigation

AC9M5P01: list the possible outcomes of chance experiments involving equally likely outcomes and compare to those which are not equally likely

AC9M5P02: conduct repeated chance experiments including those with and without equally likely outcomes, observe and record the results; use frequency to compare outcomes and estimate their likelihoods

Year 6

By the end of Year 6, students use integers to represent points on a number line and in the Cartesian plane. They solve problems using the properties of prime, composite and square numbers. Students order common fractions, giving reasons, and add and subtract fractions with related denominators. They use all 4 operations with decimals and connect decimal representations of measurements to the metric system. Students solve problems involving finding a fraction, decimal or percentage of a quantity and use estimation to find approximate solutions to problems involving rational numbers and percentages. They use mathematical modelling to solve financial and other practical problems involving percentages and rational numbers, formulating and solving the problem, and justifying choices. Students find unknown values in numerical equations involving combinations of arithmetic operations. They identify and explain rules used to create growing patterns. Students create and use algorithms to generate sets of numbers, using a rule.

They interpret and use timetables. Students convert between common units of length, mass and capacity. They use the formula for the area of a rectangle and angle properties to solve problems. Students identify the parallel cross-section for right prisms. They create tessellating patterns using combinations of transformations. Students locate an ordered pair in any one of the 4 quadrants on the Cartesian plane.

They compare distributions of discrete and continuous numerical and ordinal categorical data sets as part of their statistical investigations, using digital tools. Students critique arguments presented in the media based on statistics. They assign probabilities using common fractions, decimal and percentages. Students conduct simulations using digital tools, to generate and record the outcomes from many trials of a chance experiment. They compare observed frequencies to the expected frequencies of the outcomes of chance experiments.

AC9M6N01: recognise situations, including financial contexts, that use integers; locate and represent integers on a number line and as coordinates on the Cartesian plane

AC9M6N02: identify and describe the properties of prime, composite and square numbers and use these properties to solve problems and simplify calculations

AC9M6N03: apply knowledge of equivalence to compare, order and represent common fractions including halves, thirds and quarters on the same number line and justify their order

AC9M6N04: apply knowledge of place value to add and subtract decimals, using digital tools where appropriate; use estimation and rounding to check the reasonableness of answers

AC9M6N05: solve problems involving addition and subtraction of fractions using knowledge of equivalent fractions

AC9M6N06: multiply and divide decimals by multiples of powers of 10 without a calculator, applying knowledge of place value and proficiency with multiplication facts; using estimation and rounding to check the reasonableness of answers

AC9M6N07: solve problems that require finding a familiar fraction, decimal or percentage of a quantity, including percentage discounts, choosing efficient calculation strategies and using digital tools where appropriate

AC9M6N08: approximate numerical solutions to problems involving rational numbers and percentages, including financial contexts, using appropriate estimation strategies

AC9M6N09: use mathematical modelling to solve practical problems involving natural and rational numbers and percentages, including in financial contexts; formulate the problems, choosing operations and efficient calculation strategies, and using digital tools where appropriate; interpret and communicate solutions in terms of the situation, justifying the choices made

AC9M6A01: recognise and use rules that generate visually growing patterns and number patterns involving rational numbers

AC9M6A02: find unknown values in numerical equations involving brackets and combinations of arithmetic operations, using the properties of numbers and operations

AC9M6A03: create and use algorithms involving a sequence of steps and decisions that use rules to generate sets of numbers; identify, interpret and explain emerging patterns

AC9M6M01: convert between common metric units of length, mass and capacity; choose and use decimal representations of metric measurements relevant to the context of a problem

AC9M6M02: establish the formula for the area of a rectangle and use it to solve practical problems

AC9M6M03: interpret and use timetables and itineraries to plan activities and determine the duration of events and journeys

AC9M6M04: identify the relationships between angles on a straight line, angles at a point and vertically opposite angles; use these to determine unknown angles, communicating reasoning

AC9M6SP01: compare the parallel cross-sections of objects and recognise their relationships to right prisms

AC9M6SP02: locate points in the 4 quadrants of a Cartesian plane; describe changes to the coordinates when a point is moved to a different position in the plane

AC9M6SP03: recognise and use combinations of transformations to create tessellations and other geometric patterns, using dynamic geometric software where appropriate

AC9M6ST01: interpret and compare data sets for ordinal and nominal categorical, discrete and continuous numerical variables using comparative displays or visualisations and digital tools; compare distributions in terms of mode, range and shape

AC9M6ST02: identify statistically informed arguments presented in traditional and digital media; discuss and critique methods, data representations and conclusions

AC9M6ST03: plan and conduct statistical investigations by posing and refining questions or identifying a problem and collecting relevant data; analyse and interpret the data and communicate findings within the context of the investigation

AC9M6P01: recognise that probabilities lie on numerical scales of 0 – 1 or 0% – 100% and use estimation to assign probabilities that events occur in a given context, using common fractions, percentages and decimals

AC9M6P02: conduct repeated chance experiments and run simulations with an increasing number of trials using digital tools; compare observations with expected results and discuss the effect on variation of increasing the number of trials

Year 7

By the end of Year 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation. They solve problems involving squares of numbers and square roots of perfect square numbers. Students solve problems involving addition and subtraction of integers. They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient calculation strategies. Students choose between equivalent representations of rational numbers and percentages to assist in calculations. They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios, in financial and other applied contexts, justifying choices of representation. Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values. They solve linear equations with natural number solutions. Students create tables of values related to algebraic expressions and formulas, and describe the effect of variation.

They apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons. Students use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems. They describe the relationships between the radius, diameter and circumference of a circle. Students classify polygons according to their features and create an algorithm designed to sort and classify shapes. They represent objects two-dimensionally in different ways, describing the usefulness of these representations. Students use coordinates to describe transformations of points in the plane.

They plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays. Students interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers. They decide which measure of central tendency is most suitable and explain their reasoning. Students list sample spaces for single step experiments, assign probabilities to outcomes and predict relative frequencies for related events. They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results.

AC9M7N01: describe the relationship between perfect square numbers and square roots, and use squares of numbers and square roots of perfect square numbers to solve problems

AC9M7N02: represent natural numbers as products of powers of prime numbers using exponent notation

AC9M7N03: represent natural numbers in expanded notation using place value and powers of 10

AC9M7N04: find equivalent representations of rational numbers and represent rational numbers on a number line

AC9M7N05: round decimals to a given accuracy appropriate to the context and use appropriate rounding and estimation to check the reasonableness of solutions

AC9M7N06: use the 4 operations with positive rational numbers including fractions, decimals and percentages to solve problems using efficient calculation strategies

AC9M7N07: compare, order and solve problems involving addition and subtraction of integers

AC9M7N08: recognise, represent and solve problems involving ratios

AC9M7N09: use mathematical modelling to solve practical problems, involving rational numbers and percentages, including financial contexts; formulate problems, choosing representations and efficient calculation strategies, using digital tools as appropriate; interpret and communicate solutions in terms of the situation, justifying choices made about the representation

AC9M7A01: recognise and use variables to represent everyday formulas algebraically and substitute values into formulas to determine an unknown

AC9M7A02: formulate algebraic expressions using constants, variables, operations and brackets

AC9M7A03: solve one-variable linear equations with natural number solutions; verify the solution by substitution

AC9M7A04: describe relationships between variables represented in graphs of functions from authentic data

AC9M7A05: generate tables of values from visually growing patterns or the rule of a function; describe and plot these relationships on the Cartesian plane

AC9M7A06: manipulate formulas involving several variables using digital tools, and describe the effect of systematic variation in the values of the variables

AC9M7M01: solve problems involving the area of triangles and parallelograms using established formulas and appropriate units

AC9M7M02: solve problems involving the volume of right prisms including rectangular and triangular prisms, using established formulas and appropriate units

AC9M7M03: describe the relationship between πr and the features of circles including the circumference, radius and diameter

AC9M7M04: identify corresponding, alternate and co interior relationships between angles formed when parallel lines are crossed by a transversal; use them to solve problems and explain reasons

AC9M7M05: demonstrate that the interior angle sum of a triangle in the plane is 180° and apply this to determine the interior angle sum of other shapes and the size of unknown angles

AC9M7M06: use mathematical modelling to solve practical problems involving ratios; formulate problems, interpret and communicate solutions in terms of the situation, justifying choices made about the representation

AC9M7SP01: represent objects in 2 dimensions; discuss and reason about the advantages and disadvantages of different representations

AC9M7SP02: classify triangles, quadrilaterals and other polygons according to their side and angle properties; identify and reason about relationships

AC9M7SP03: describe transformations of a set of points using coordinates in the Cartesian plane, translations and reflections on an axis, and rotations about a given point

AC9M7SP04: design and create algorithms involving a sequence of steps and decisions that will sort and classify sets of shapes according to their attributes, and describe how the algorithms work

AC9M7ST01: acquire data sets for discrete and continuous numerical variables and calculate the range, median, mean and mode; make and justify decisions about which measures of central tendency provide useful insights into the nature of the distribution of data

AC9M7ST02: create different types of numerical data displays including stem and leaf plots using software where appropriate; describe and compare the distribution of data, commenting on the shape, centre and spread including outliers and determining the range, median, mean and mode

AC9M7ST03: plan and conduct statistical investigations involving data for discrete and continuous numerical variables; analyse and interpret distributions of data and report findings in terms of shape and summary statistics

AC9M7P01: identify the sample space for single-stage events; assign probabilities to the outcomes of these events and predict relative frequencies for related events

AC9M7P02: conduct repeated chance experiments and run simulations with a large number of trials using digital tools; compare predictions about outcomes with observed results, explaining the differences

Year 8

By the end of Year 8, students recognise irrational numbers and terminating or recurring decimals. They apply the exponent laws to calculations with numbers involving positive integer exponents. Students solve problems involving the 4 operations with integers and positive rational numbers. They use mathematical modelling and to solve practical problems involving ratios, percentages and rates in measurement and financial contexts. Students apply algebraic properties to rearrange, expand and factorise linear expressions. They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically. Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context. They make and test conjectures involving linear relations using digital tools.

Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms. They use Pythagoras' theorem to solve measurement problems involving unknown lengths of right-angle triangles. Students use formulas to solve problems involving the area and circumference of circles. They solve problems of duration involving 12- and 24-hour cycles across multiple time zones. Students use 3 dimensions to locate and describe position. They identify conditions for congruency and similarity in shapes and create and test algorithms designed to test for congruency and similarity. Students apply the properties of quadrilaterals to solve problems.

They conduct statistical investigations and explain the implications of obtaining data through sampling. Students analyse and describe the distribution of data. They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range. Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems. They conduct experiments and simulations using digital tools to determine related probabilities of compound events.

AC9M8N01: recognise irrational numbers in applied contexts, including square roots and π

AC9M8N02: establish and apply the exponent laws with positive integer exponents and the zero-exponent, using exponent notation with numbers

AC9M8N03: recognise terminating and recurring decimals, using digital tools as appropriate

AC9M8N04: use the 4 operations with integers and with rational numbers, choosing and using efficient strategies and digital tools where appropriate

AC9M8N05: use mathematical modelling to solve practical problems involving rational numbers and percentages, including financial contexts; formulate problems, choosing efficient calculation strategies and using digital tools where appropriate; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model

AC9M8A01: create, expand, factorise, rearrange and simplify linear expressions, applying the associative, commutative, identity, distributive and inverse properties

AC9M8A02: graph linear relations on the Cartesian plane using digital tools where appropriate; solve linear equations and one-variable inequalities using graphical and algebraic techniques; verify solutions by substitution

AC9M8A03: use mathematical modelling to solve applied problems involving linear relations, including financial contexts; formulate problems with linear functions, choosing a representation; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model

AC9M8A04: experiment with linear functions and relations using digital tools, making and testing conjectures and generalising emerging patterns

AC9M8M01: solve problems involving the area and perimeter of irregular and composite shapes using appropriate units

AC9M8M02: solve problems involving the volume and capacity of right prisms using appropriate units

AC9M8M03: solve problems involving the circumference and area of a circle using formulas and appropriate units

AC9M8M04: solve problems involving duration, including using 12- and 24-hour time across multiple time zones

AC9M8M05: recognise and use rates to solve problems involving the comparison of 2 related quantities of different units of measure

AC9M8M06: use Pythagoras' theorem to solve problems involving the side lengths of right-angled triangles

AC9M8M07: use mathematical modelling to solve practical problems involving ratios and rates, including financial contexts; formulate problems; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model

AC9M8SP01: identify the conditions for congruence and similarity of triangles and explain the conditions for other sets of common shapes to be congruent or similar, including those formed by transformations

AC9M8SP02: establish properties of quadrilaterals using congruent triangles and angle properties, and solve related problems explaining reasoning

AC9M8ST01: investigate techniques for data collection including census, sampling, experiment and observation, and explain the practicalities and implications of obtaining data through these techniques

AC9M8ST02: analyse and report on the distribution of data from primary and secondary sources using random and non-random sampling techniques to select and study samples

AC9M8ST03: compare variations in distributions and proportions obtained from random samples of the same size drawn from a population and recognise the effect of sample size on this variation

AC9M8ST04: plan and conduct statistical investigations involving samples of a population; use ethical and fair methods to make inferences about the population and report findings, acknowledging uncertainty

AC9M8SP03: describe the position and location of objects in 3 dimensions in different ways, including using a three dimensional coordinate system with the use of dynamic geometric software and other digital tools

AC9M8SP04: design, create and test algorithms involving a sequence of steps and decisions that identify congruency or similarity of shapes, and describe how the algorithm works

AC9M8P01: recognise that complementary events have a combined probability of one; use this relationship to calculate probabilities in applied contexts

AC9M8P02: determine all possible combinations for 2 events, using two way tables, tree diagrams and Venn diagrams, and use these to determine probabilities of specific outcomes in practical situations

AC9M8P03: conduct repeated chance experiments and simulations, using digital tools to determine probabilities for compound events, and describe results

Year 9

By the end of Year 9, students recognise and use rational and irrational numbers to solve problems. They extend and apply the exponent laws with positive integers to variables. Students expand binomial products, and factorise monic quadratic expressions. They find the distance between 2 points on the Cartesian plane, and the gradient and midpoint of a line segment. Students use mathematical modelling to solve problems involving change in financial and other applied contexts, choosing to use linear and quadratic functions. They graph quadratic functions and solve monic quadratic equations with integer roots algebraically. Students describe the effects of variation of parameters on functions and relations, using digital tools, and make connections between their graphical and algebraic representations.

They apply formulas to solve problems involving the surface area and volume of right prisms and cylinders. Students solve problems involving ratio, similarity and scale in two-dimensional situations. They determine percentage errors in measurements. Students apply Pythagoras' theorem and use trigonometric ratios to solve problems involving right-angled triangles. They use mathematical modelling to solve practical problems involving direct proportion, ratio and scale, evaluating the model and communicating their methods and findings. Students express small and large numbers in scientific notation. They apply the enlargement transformation to images of shapes and objects, and interpret results. Students design, use and test algorithms based on geometric constructions or theorems.

They compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of distributions, and consider the effect of outliers. Students explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view. They determine sets of outcomes for compound events and represent these in various ways. Students assign probabilities to the outcomes of compound events. They design and conduct experiments or simulations for combined events using digital tools.

AC9M9N01: recognise that the real number system includes the rational numbers and the irrational numbers, and solve problems involving real numbers using digital tools

AC9M9A01: apply the exponent laws to numerical expressions with integer exponents and extend to variables

AC9M9A02: simplify algebraic expressions, expand binomial products and factorise monic quadratic expressions

AC9M9A03: find the gradient of a line segment, the midpoint of the line interval and the distance between 2 distinct points on the Cartesian plane

AC9M9A04: identify and graph quadratic functions, solve quadratic equations graphically and numerically, and solve monic quadratic equations with integer roots algebraically, using graphing software and digital tools as appropriate

AC9M9A05: use mathematical modelling to solve applied problems involving change including financial contexts; formulate problems, choosing to use either linear or quadratic functions; interpret solutions in terms of the situation; evaluate the model and report methods and findings

AC9M9A06: experiment with the effects of the variation of parameters on graphs of related functions, using digital tools, making connections between graphical and algebraic representations, and generalising emerging patterns

AC9M9M01: solve problems involving the volume and surface area of right prisms and cylinders using appropriate units

AC9M9M02: solve problems involving very small and very large measurements, time scales and intervals expressed in scientific notation

AC9M9M03: solve spatial problems, applying angle properties, scale, similarity, Pythagoras' theorem and trigonometry in right-angled triangles

AC9M9M04: calculate and interpret absolute, relative and percentage errors in measurements, recognising that all measurements are estimates

AC9M9M05: use mathematical modelling to solve practical problems involving direct proportion, rates, ratio and scale, including financial contexts; formulate the problems and interpret solutions in terms of the situation; evaluate the model and report methods and findings

AC9M9SP01: recognise the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles using properties of similarity

AC9M9SP02: apply the enlargement transformation to shapes and objects using dynamic geometry software as appropriate; identify and explain aspects that remain the same and those that change

AC9M9SP03: design, test and refine algorithms involving a sequence of steps and decisions based on geometric constructions and theorems; discuss and evaluate refinements

AC9M9ST01: analyse reports of surveys in digital media and elsewhere for information on how data was obtained to estimate population means and medians

AC9M9ST02: analyse how different sampling methods can affect the results of surveys and how choice of representation can be used to support a particular point of view

AC9M9ST03: represent the distribution of multiple data sets for numerical variables using comparative representations; compare data distributions with consideration of centre, spread and shape, and the effect of outliers on these measures

AC9M9ST04: choose appropriate forms of display or visualisation for a given type of data; justify selections and interpret displays for a given context

AC9M9ST05: plan and conduct statistical investigations involving the collection and analysis of different kinds of data; report findings and discuss the strength of evidence to support any conclusions

AC9M9P01: list all outcomes for compound events both with and without replacement, using lists, tree diagrams, tables or arrays; assign probabilities to outcomes

AC9M9P02: calculate relative frequencies from given or collected data to estimate probabilities of events involving “and”, inclusive “or” and exclusive “or”

AC9M9P03: design and conduct repeated chance experiments and simulations, using digital tools to compare probabilities of simple events to related compound events, and describe results